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**REPORT OF THE COMMITTEE ON MORTALITY UNDER
ORDINARY INSURANCES AND ANNUITIES**

MORTALITY UNDER INDIVIDUAL IMMEDIATE ANNUITIES

(Issues of 1931 to 1947, Observed between 1946 and 1948 Anniversaries)

Last year the mortality under individual immediate annuities between 1941 and 1946 contract anniversaries was reported on in *TASA XLIX*, 112. That report marked the resumption of the series of investigations which had been begun in 1936 but which had been allowed to lapse during the war. The nineteen companies which contributed to the 1941-1946 study have furnished data on their experience between 1946 and 1948 contract anniversaries to the Committee on Mortality under Ordinary Insurances and Annuities, and the results are the subject of this report.

The current investigation covers immediate single-life annuities issued in the United States and Canada during the years 1931 to 1947, inclusive, and observed between 1946 and 1948 contract anniversaries. The study is by number of contracts and by amount of annual income. The data are divided into the following four categories:

- Nonrefund annuities, male lives
- Nonrefund annuities, female lives
- Refund annuities, male lives.
- Refund annuities, female lives.

In the refund class are included cash and instalment refund annuities and any annuities which provide for a period certain.

The following types of annuities have been excluded: (a) annuities issued in conjunction with single premium insurance without evidence of insurability, or which provide at all times for the payment of virtually the entire consideration as a death benefit, (b) supplementary contracts, (c) underaverage risks with special rate concessions, (d) temporary annuities, (e) joint and survivor annuities (or annuities to single survivors of contracts originally issued on joint basis), (f) deferred annuities both before and after the end of the deferred period, and (g) annuities under group annuity contracts.

The issue age was taken as the nearest age at the beginning of the annuity period, or an approximation thereto.

Since the 1941-1946 study had indicated quite clearly that temporary or initial selection persisted for no more than three or four years at the

most, the contributing companies this time were asked to furnish data for individual issue ages and individual years of duration from one to five and for individual attained ages for the sixth and later contract years combined. While the data were assembled separately for the experience years ending in 1947 and in 1948, the two years have been combined for the purposes of this report. The over-all mortality ratios for the experience year between 1947 and 1948 anniversaries tended to be lower than for the 1946-1947 experience except in the Refund—Male Lives category where some increase was observed.

RESULTS OF THE INVESTIGATION

A summary of the results of the current investigation is given in Table 1. Details will be found in Tables 3 and 4 at the end of the report. The expected deaths have been computed according to the 1937 Standard Annuity Table, under which the mortality rates for women are equal to the mortality rates for men with the age rated down five years. Over-all mortality ratios must be interpreted with great care because the progression by age of the rates of mortality in the Standard Annuity Table differs from current actual experience. The proportion of data at the high ages may have a considerable effect on the over-all ratios since the mortality ratios tend to increase at the high ages, particularly in the case of women.

Table 2 was prepared for the purpose of comparing the present experience with the mortality between 1941 and 1946 policy anniversaries.* An analysis of the expected deaths in the two experiences indicated that in some instances there was a sufficient shift toward the older ages within a specified policy duration category to affect significantly the mortality ratio for all ages taken together. It was therefore felt that in order to produce a valid comparison an adjustment should be made to allow for the difference in age distributions. The procedure followed in arriving at the adjusted ratio for a duration group for all ages combined was to weight the 1946-1948 mortality ratios for the age subdivisions within the duration group by the expected deaths of the 1941-1946 experience. The adjusted ratios in effect represent what the mortality would have been in the 1946-1948 period for all ages combined if there had been no shift in the distribution of exposures by attained age within a duration group.

An analysis of Table 2 does not disclose a consistent trend in all sections of the table, but although some of the changes may be of question-

* A comparison of the mortality in the 1946-1948 period with the tables presented in the paper "A New Mortality Basis for Annuities" will be found on pp. 478-79 of this volume of the *Transactions*.

TABLE 1
SYNOPSIS OF INTERCOMPANY MORTALITY STUDY OF IMMEDIATE ANNUITIES
EXPERIENCE BETWEEN 1946 AND 1948 ANNIVERSARIES
(Mortality Ratio Equals Ratio of Actual Deaths to Expected Deaths Computed by 1937 Standard Annuity Table)

ATTAINED AGE	1ST AND 2D CONTRACT YEARS			3D, 4TH AND 5TH CONTRACT YEARS			6TH AND LATER CONTRACT YEARS			ALL CONTRACT YEARS		
	Deaths (No. of Con- tracts)	Mortality Ratio		Deaths (No. of Con- tracts)	Mortality Ratio		Deaths (No. of Con- tracts)	Mortality Ratio		Deaths (No. of Con- tracts)	Mortality Ratio	
		By No. of Con- tracts	By Amount of Income		By No. of Con- tracts	By Amount of Income		By No. of Con- tracts	By Amount of Income		By No. of Con- tracts	By Amount of Income
Nonrefund, Male Lives												
Up to 39.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
40-49.....	.....	82%	68%	.....	98%	91%	3	134%	193%	3	101%	148%
50-59.....	3			3			44			50		
60-69.....	41			54			202	100	117	297	101	106
70-79.....	53	65	55	125	103	116	744	101	96	922	98	94
80 and over.....	25	59	55	48	73	70	746	116	116	819	109	108
All ages.....	122	69%	58%	230	94%	96%	1,739	108%	109%	2,091	103%	102%
Nonrefund, Female Lives												
Up to 39.....	.....	.....	.....	1	.....	.....	1	.....	.....	2	.....	.....
40-49.....	.....	59%	45%	1	80%	71%	5	93%	112%	6	83%	91%
50-59.....	11			12			45			68		
60-69.....	45	46	59	81	64	63	351	75	69	477	69	67
70-79.....	94	72	67	170	78	87	1,669	95	94	1,933	92	91
80 and over.....	37	79	69	83	96	89	1,827	130	125	1,947	126	120
All ages.....	187	64%	64%	348	77%	82%	3,898	106%	106%	4,433	100%	100%

TABLE 1—Continued

ATTAINED AGE	1ST AND 2D CONTRACT YEARS			3D, 4TH AND 5TH CONTRACT YEARS			6TH AND LATER CONTRACT YEARS			ALL CONTRACT YEARS										
	Deaths (No. of Contracts)	Mortality Ratio		Deaths (No. of Contracts)	Mortality Ratio		Deaths (No. of Contracts)	Mortality Ratio		Deaths (No. of Contracts)	Mortality Ratio									
		By No. of Contracts	By Amount of Income		By No. of Contracts	By Amount of Income		By No. of Contracts	By Amount of Income		By No. of Contracts	By Amount of Income								
Refund, Male Lives																				
Up to 39.....	1	68%	107%	.....	79%	162%	3	62%	69%	3	44%	59%							
40-49.....	21			30			9			10										
50-59.....	21			30			110			113			161	102	174					
60-69.....	98			86			111			151			104	98	456	104	115	705	101	111
70-79.....	128			85			94			230			97	106	1,430	114	105	1,788	109	104
80 and over.....	65	112	115	167	129	97	1,157	110	118	1,389	112	116								
All ages.....	313	88%	104%	578	105%	105%	3,165	111%	114%	4,056	108%	112%								
Refund, Female Lives																				
Up to 39.....	1	90%	123%	3	62%	100%	2	106%	110%	6	110%	120%								
40-49.....	5			6			22			33										
50-59.....	39			30			127			71			67	196	70	80				
60-69.....	117			65			76			201			79	101	872	86	77	1,190	82	81
70-79.....	197			79			86			361			90	91	2,781	103	105	3,339	100	102
80 and over.....	116	128	182	268	137	137	2,801	129	134	3,185	130	136								
All ages.....	475	83%	103%	869	95%	105%	6,605	109%	110%	7,949	105%	109%								

TABLE 2
COMPARISON OF PRESENT EXPERIENCE WITH EXPERIENCE BETWEEN 1941 AND 1946 ANNIVERSARIES
(Expected Deaths Computed by 1937 Standard Annuity Table)

DURATION	BY NUMBER OF CONTRACTS					BY AMOUNT OF ANNUAL INCOME				
	Experience 1941-1946		Experience 1946-1948		% Points Change in Mortality Ratio	Experience 1941-1946		Experience 1946-1948		% Points Change in Mortality Ratio
	Deaths	Mortality Ratio	Deaths	Mortality Ratio (Adjusted)*		Deaths	Mortality Ratio	Deaths	Mortality Ratio (Adjusted)*	
	Nonrefund, Male Lives									
1 and 2.....	353	87%	122	70%	-17	\$ 171,901	84%	\$ 56,245	60%	-24
3 to 5.....	783	98	230	95	- 3	348,532	91	117,802	98	+ 7
6 and over.....	3,479	105	1,739	107	+ 2	1,960,426	111	881,812	108	- 3
	Nonrefund, Female Lives									
1 and 2.....	423	59%	187	62%	+ 3	\$ 120,904	58%	\$ 68,237	63%	+ 5
3 to 5.....	1,411	87	348	77	-10	436,414	97	108,315	80	-17
6 and over.....	7,322	106	3,898	102	- 4	2,489,823	111	1,203,452	102	- 9

* See text (p. 607) for explanation of adjustment.

TABLE 2—Continued

DURATION	BY NUMBER OF CONTRACTS					BY AMOUNT OF ANNUAL INCOME				
	Experience 1941-1946		Experience 1946-1948		% Points Change in Mortality Ratio	Experience 1941-1946		Experience 1946-1948		% Points Change in Mortality Ratio
	Deaths	Mortality Ratio	Deaths	Mortality Ratio (Adjusted)*		Deaths	Mortality Ratio	Deaths	Mortality Ratio (Adjusted)*	
	Refund, Male Lives									
1 and 2.....	877	96%	313	89%	- 7	\$ 324,220	104%	\$ 145,949	104%	0
3 to 5.....	1,843	108	578	105	- 3	635,173	108	189,503	105	- 3
6 and over.....	6,170	114	3,165	111	- 3	2,745,083	135	1,134,949	114	- 21
	Refund, Female Lives									
1 and 2.....	1,150	76%	475	83%	+ 7	\$ 270,313	77%	\$ 159,910	104%	+ 27
3 to 5.....	3,231	100	869	94	- 6	736,240	97	220,393	105	+ 8
6 and over.....	11,508	108	6,605	106	- 2	3,222,193	112	1,701,442	107	- 5

* See text (p. 607) for explanation of adjustment.

TABLE 3
INTERCOMPANY MORTALITY STUDY OF IMMEDIATE ANNUITIES
EXPERIENCE BETWEEN 1946 AND 1948 ANNIVERSARIES
(Expected Deaths Computed by 1937 Standard Annuity Table)

DURATION	ATTAINED AGE	NONREFUND, MALE LIVES								
		Exposures		Actual Deaths		Expected Deaths		Mortality Ratios		
		No. of Contracts	Amount of Annual Income	No. of Contracts	Amount of Annual Income	No. of Contracts	Amount of Annual Income	By No. of Contracts	By Am't of Income	
1	Up to 39	11	\$ 2,599			.03	\$ 9			
	40-49	79	20,831			.55	139			
	50-59	289	127,047	1	\$ 607	4.16	1,881	*	*	
	60-69	737	337,498	14	6,739	22.00	10,288	64%	66%	
	70-79	669	415,585	26	12,867	37.63	23,196	69	55	
	80-89	182	96,992	7	3,309	19.50	10,230	*	*	
	90 and over	2	420	1	180	.37	78	*	*	
	All ages	1,969	\$ 1,000,972	49	\$ 23,702	84.24	\$ 45,821	58%	52%	
	2	Up to 39	5	\$ 2,138			.02	\$ 7		
		40-49	91	17,742			.62	120		
50-59		274	110,229	2	\$ 432	3.92	1,625	*	*	
60-69		745	314,847	27	8,361	22.48	9,619	120%	87%	
70-79		783	456,785	27	13,804	44.53	25,780	61	54	
80-89		203	126,203	16	9,706	22.07	13,806	72	70	
90 and over		1	180	1	180	.18	32	* 7*	*	
All ages		2,102	\$ 1,028,124	73	\$ 32,543	93.82	\$ 50,989	78%	64%	
3		Up to 39	2	\$ 960			.01	\$ 4		
		40-49	85	10,032			.62	70		
	50-59	210	54,191	2	\$ 1,751	2.91	753	*	*	
	60-69	616	231,728	22	6,831	18.53	6,936	119%	98%	
	70-79	713	398,243	37	20,020	41.53	22,717	89	88	
	80-89	188	103,978	11	7,401	20.61	12,050	53	61	
	90 and over	1	1,077	1	1,077	.18	191	* 5*	*	
	All ages	1,815	\$ 800,209	73	\$ 37,080	84.39	\$ 42,721	87%	87%	
	4	Up to 39	2	\$ 110						
		40-49	63	6,444			.44	\$ 44		
50-59		174	47,312	1	\$ 57	2.50	697	*	*	
60-69		559	198,954	17	4,473	16.87	5,987	101%	75%	
70-79		652	321,292	35	22,109	38.61	18,900	91	117	
80-89		183	96,771	14	7,754	20.60	11,487	68	68	
90 and over		6	15,391	1	457	1.17	2,932	* 6*	*	
All ages		1,639	\$ 686,274	68	\$ 34,850	80.19	\$ 40,047	85%	87%	
5		Up to 39	6	\$ 410			.01			
		40-49	37	3,653			.28	\$ 24		
	50-59	97	22,204			1.44	332			
	60-69	474	158,010	15	\$ 4,681	14.36	4,786	104%	98%	
	70-79	693	319,775	53	28,054	40.86	19,120	130	147	
	80-89	185	105,528	19	12,658	20.83	12,517	91	101	
	90 and over	10	16,743	2	479	1.95	3,369	* 2*	*	
	All ages	1,502	\$ 626,323	89	\$ 45,872	79.73	\$ 40,148	112%	114%	
	6 and over	Up to 39	163	\$ 42,228			.40	\$ 117		
		40-49	562	147,322	3	\$ 801	3.92	1,056	*	*
50-59		2,155	781,910	44	23,494	30.74	11,422	143%	206%	
60-69		6,610	2,643,270	202	93,763	201.07	79,890	100	117	
70-79		12,318	5,946,585	744	348,222	736.56	361,525	101	96	
80-89		5,015	2,613,344	630	322,219	566.10	299,852	111	107	
90 and over		382	292,005	116	93,313	77.73	58,400	149	160	
All ages		27,205	\$12,466,664	1,739	\$ 881,812	1,616.52	\$ 812,262	108%	109%	
All		Up to 39	189	\$ 48,445			.47	\$ 137		
		40-49	917	206,024	3	\$ 801	6.43	1,453	*	*
	50-59	3,199	1,142,893	50	26,341	45.67	16,710	109%	158%	
	60-69	9,741	3,884,307	297	124,848	295.31	117,506	101	106	
	70-79	15,828	7,858,265	922	445,136	939.72	471,238	98	94	
	80-89	5,956	3,142,816	697	363,047	669.71	359,942	104	101	
	90 and over	402	325,816	122	95,686	81.58	65,002	150	147	
	All ages	36,232	\$16,608,566	2,091	\$1,055,859	2,038.89	\$1,031,988	103%	102%	

* Mortality ratios not shown where less than ten contracts terminated by death.

TABLE 3—Continued

DURATION	ATTAINED AGE	NONREFUND, FEMALE LIVES								
		Exposures		Actual Deaths		Expected Deaths		Mortality Ratios		
		No. of Contracts	Amount of Annual Income	No. of Contracts	Amount of Annual Income	No. of Contracts	Amount of Annual Income	By No. of Contracts	By Am't of Income	
1	Up to 39	14	\$ 2,725	.....	.....	01	\$ 6	.....	.....
	40-49	95	30,928	.....	.....	47	155	.....	.....
	50-59	895	267,081	5	\$ 897	9.08	2,676	*	*	
	60-69	2,397	737,793	18	9,154	46.74	14,344	39%	64%	
	70-79	1,564	616,927	42	17,980	60.15	23,769	70	76	
	80-89	275	141,344	19	10,088	19.77	10,432	96	97	
	90 and over	1	182	.....	.....	14	26	.....	.....
	All ages	5,241	\$ 1,796,980	84	\$ 38,119	136.36	\$ 51,408	62%	74%	
	2	Up to 39	12	\$ 6,238	01	\$ 14
		40-49	88	23,049	41	115
50-59		847	245,576	6	\$ 1,567	8.68	2,512	*	*	
60-69		2,619	747,358	27	8,276	51.77	15,018	52%	55%	
70-79		1,835	676,849	52	15,454	70.13	26,226	74	59	
80-89		369	152,208	18	4,821	26.60	11,056	68	44	
90 and over		3	891	.....	.....	40	117	.....	.....
All ages		5,773	\$ 1,852,169	103	\$ 30,118	158.00	\$ 55,058	65%	55%	
3		Up to 39	17	\$ 7,208	02	\$ 17
		40-49	79	21,296	37	101
	50-59	621	164,193	5	\$ 1,382	6.35	1,698	*	*	
	60-69	2,310	603,233	30	8,489	46.39	12,347	65%	69%	
	70-79	1,825	601,695	54	23,026	70.32	23,397	77	98	
	80-89	365	147,948	19	6,742	26.90	11,039	71	61	
	90 and over	6	3,053	.....	.....	74	381	.....	.....
	All ages	5,223	\$ 1,548,626	108	\$ 39,639	151.09	\$ 48,980	71%	81%	
	4	Up to 39	16	\$ 3,755	01	\$ 7
		40-49	70	27,272	1	\$ 594	33	125	*	*
50-59		547	120,867	6	898	5.46	1,208	*	*	
60-69		2,104	488,443	33	6,100	42.22	9,855	78%	62%	
70-79		1,936	541,343	63	18,149	75.52	21,552	83	84	
80-89		369	148,985	32	12,574	27.44	11,054	117	114	
90 and over		13	4,855	1	120	1.74	667	*	*	
All ages		5,055	\$ 1,335,520	136	\$ 38,435	152.72	\$ 44,468	89%	86%	
5		Up to 39	19	\$ 5,618	1	\$ 84	01	\$ 7	*	*
		40-49	62	20,021	29	88
	50-59	473	102,948	.....	.....	4.73	1,044	*	*
	60-69	1,857	379,747	18	4,438	37.93	7,797	47%	57%	
	70-79	1,870	484,655	53	14,718	73.10	19,386	73	76	
	80-89	381	140,613	28	9,134	28.60	10,599	98	86	
	90 and over	10	3,528	3	1,765	1.39	514	*	*	
	All ages	4,672	\$ 1,137,130	104	\$ 30,241	146.05	\$ 39,435	71%	77%	
	6 and over	Up to 39	238	\$ 69,045	1	\$ 210	45	\$ 129	*	*
		40-49	878	288,526	5	1,202	4.09	1,352	*	*
50-59		4,956	1,459,731	45	16,752	50.27	14,760	90%	113%	
60-69		22,252	5,706,994	351	82,173	465.55	118,596	75	69	
70-79		42,898	11,654,988	1,669	451,798	1,752.02	479,248	95	94	
80-89		16,277	5,764,617	1,614	564,447	1,251.13	457,256	129	123	
90 and over		1,086	457,662	213	86,870	154.98	65,144	137	133	
All ages		88,585	\$25,401,563	3,898	\$1,203,452	3,678.49	\$1,136,485	106%	106%	
All		Up to 39	316	\$ 94,589	2	\$ 294	51	\$ 180	*	*
		40-49	1,272	411,092	6	1,796	5.96	1,936	*	*
	50-59	8,339	2,360,396	68	21,598	84.57	23,898	80%	90%	
	60-69	33,539	8,663,568	477	118,630	690.60	177,957	69	67	
	70-79	51,928	14,576,457	1,933	541,125	2,101.24	593,578	92	91	
	80-89	18,036	6,495,715	1,730	607,806	1,380.44	511,436	125	119	
	90 and over	1,119	470,171	217	88,755	159.39	66,849	136	133	
	All ages	114,549	\$33,071,988	4,433	\$1,380,004	4,422.71	\$1,375,834	100%	100%	

* Mortality ratios not shown where less than ten contracts terminated by death.

TABLE 4
INTERCOMPANY MORTALITY STUDY OF IMMEDIATE ANNUITIES
EXPERIENCE BETWEEN 1946 AND 1948 ANNIVERSARIES
(Expected Deaths Computed by 1937 Standard Annuity Table)

DURATION	ATTAINED AGE	REFUND, MALE LIVES							
		Exposures		Actual Deaths		Expected Deaths		Mortality Ratios	
		No. of Contracts	Amount of Annual Income	No. of Contracts	Amount of Annual Income	No. of Contracts	Amount of Annual Income	By No. of Contracts	By Am't of Income
1	Up to 39	147	\$ 41,772	1	\$ 1,200	.31	\$ 107	.....	.....
	40-49	254	94,268	1	1,777	1.77	646	*	*
	50-59	936	363,261	10	2,106	13.52	5,183	74%	41%
	60-69	1,986	810,856	50	34,291	56.50	22,999	88	149
	70-79	1,272	517,385	39	16,615	70.26	28,635	56	58
	80-89	215	93,065	23	9,693	23.13	10,054	99	96
	90 and over	8	835	2	216	1.48	154	*	*
	All ages	4,818	\$ 1,921,442	125	\$ 64,121	166.97	\$ 67,778	75%	95%
2	Up to 39	123	\$ 29,807	.....	.....	.26	\$ 81	.....	.....
	40-49	269	88,023	.....	.....	1.86	605	.....	.....
	50-59	1,001	350,877	11	\$ 9,199	14.55	5,114	76%	180%
	60-69	1,985	754,794	48	15,752	57.56	21,891	83	72
	70-79	1,444	541,513	89	38,924	80.83	30,617	110	127
	80-89	294	124,140	36	16,638	31.72	13,580	113	123
	90 and over	9	2,587	4	1,315	1.73	489	*	*
	All ages	5,125	\$ 1,891,741	188	\$ 81,828	188.51	\$ 72,377	100%	113%
3	Up to 39	105	\$ 26,072	.....	.....	.25	\$ 73	.....	.....
	40-49	255	74,165	.....	.....	1.78	493	.....	.....
	50-59	836	244,350	11	\$ 6,565	11.97	3,461	92%	90%
	60-69	1,815	625,683	56	17,183	53.18	18,290	105	94
	70-79	1,340	458,052	72	26,165	74.72	25,651	96	102
	80-89	341	131,164	30	8,892	37.76	14,847	79	60
	90 and over	11	5,329	3	621	2.04	971	*	*
	All ages	4,703	\$ 1,564,815	172	\$ 59,426	181.70	\$ 63,786	95%	93%
4	Up to 39	105	\$ 31,173	.....	.....	.28	\$ 91	.....	.....
	40-49	263	68,652	.....	.....	1.81	440	.....	.....
	50-59	772	230,632	15	\$ 9,767	10.95	3,267	137%	299%
	60-69	1,728	567,463	55	14,514	51.14	16,864	108	86
	70-79	1,460	430,983	62	20,043	81.25	24,268	76	83
	80-89	385	131,184	56	10,517	43.11	15,254	130	69
	90 and over	16	4,624	11	2,901	2.90	858	379	338
	All ages	4,729	\$ 1,464,711	199	\$ 57,742	191.44	\$ 61,042	104%	95%
5	Up to 39	88	\$ 25,048	.....	.....	.19	\$ 68	.....	.....
	40-49	220	57,366	.....	.....	1.48	389	.....	.....
	50-59	632	182,868	4	\$ 1,396	9.06	2,676	*	*
	60-69	1,376	414,575	40	14,620	40.72	12,247	98%	119%
	70-79	1,428	412,165	96	32,715	81.17	24,319	118	135
	80-89	361	125,914	58	21,379	39.88	14,570	145	147
	90 and over	20	7,126	9	2,225	3.71	1,323	*	*
	All ages	4,125	\$ 1,225,062	207	\$ 72,335	176.21	\$ 55,592	117%	130%
6 and over	Up to 39	1,129	\$ 402,041	3	\$ 2,239	3.16	\$ 1,129	*	*
	40-49	2,344	721,892	9	1,899	16.07	4,892	*	*
	50-59	6,934	2,311,529	110	62,009	97.24	32,521	113%	191%
	60-69	14,798	4,992,652	456	169,914	437.79	148,297	104	115
	70-79	21,368	7,216,588	1,430	443,856	1,249.63	422,868	114	105
	80-89	8,517	3,007,031	1,009	394,640	936.82	338,471	108	117
	90 and over	555	231,315	148	60,392	112.99	46,350	131	130
	All ages	55,645	\$18,883,048	3,165	\$1,134,949	2,853.70	\$ 994,528	111%	114%
All	Up to 39	1,697	\$ 555,913	3	\$ 2,239	4.45	\$ 1,549	*	*
	40-49	3,605	1,104,366	10	3,099	24.77	7,465	40%	42%
	50-59	11,111	3,683,517	161	91,042	157.29	52,222	102	174
	60-69	23,688	8,166,023	705	266,274	696.89	240,588	101	111
	70-79	28,312	9,576,686	1,788	578,318	1,637.86	556,358	109	104
	80-89	10,113	3,612,498	1,212	461,759	1,112.42	406,776	109	114
	90 and over	619	251,816	177	67,670	124.85	50,145	142	135
	All ages	79,145	\$26,950,819	4,056	\$1,470,401	3,758.53	\$1,315,103	108%	112%

* Mortality ratios not shown where less than ten contracts terminated by death.

TABLE 4—Continued

DURATION	ATTAINED AGE	REFUND, FEMALE LIVES							
		Exposures		Actual Deaths		Expected Deaths		Mortality Ratios	
		No. of Contracts	Amount of Annual Income	No. of Contracts	Amount of Annual Income	No. of Contracts	Amount of Annual Income	By No. of Contracts	By Am't of Income
1	Up to 39	178	\$ 68,730	1	\$ 504	.30	\$ 127	*	*
	40-49	512	179,109	2	456	2.39	839	*	*
	50-59	2,236	632,343	23	11,346	22.07	6,145	104%	185%
	60-69	4,352	1,156,509	46	12,691	84.42	22,617	54	56
	70-79	2,917	835,993	73	19,002	113.56	32,757	64	58
	80-89	528	162,478	35	22,173	38.38	11,847	91	187
	90 and over	13	1,774	5	592	1.77	243	*	*
	All ages	10,736	\$ 3,036,936	185	\$ 66,764	262.89	\$ 74,575	70%	90%
2	Up to 39	216	\$ 81,665	.....	.....	.39	\$ 151	.....	.....
	40-49	493	155,764	3	385	2.35	723	*	*
	50-59	2,294	600,958	16	4,316	22.69	5,833	71%	74%
	60-69	4,903	1,157,214	71	21,892	95.72	22,665	74	97
	70-79	3,445	914,342	124	40,052	134.34	35,772	92	112
	80-89	657	194,088	72	25,993	48.41	14,452	149	180
	90 and over	16	3,766	4	508	2.26	551	*	*
	All ages	12,024	\$ 3,107,797	290	\$ 93,146	306.16	\$ 80,147	95%	116%
3	Up to 39	204	\$ 57,895	1	\$ 1,800	.40	\$ 113	*	*
	40-49	425	125,595	2	420	1.93	563	*	*
	50-59	2,058	505,393	11	3,873	20.32	4,938	54%	78%
	60-69	4,507	1,048,990	61	18,760	89.08	20,779	68	90
	70-79	3,289	761,096	112	29,909	127.50	29,504	88	101
	80-89	734	196,059	61	16,950	54.25	14,754	112	115
	90 and over	20	4,610	8	2,058	2.78	681	*	*
	All ages	11,237	\$ 2,699,638	256	\$ 73,770	296.26	\$ 71,332	86%	103%
4	Up to 39	197	\$ 49,264	2	\$ 640	.36	\$ 96	*	*
	40-49	458	130,795	3	462	2.12	599	*	*
	50-59	1,914	448,101	16	6,073	19.16	4,423	84%	137%
	60-69	4,333	951,951	68	23,075	86.45	19,052	79	121
	70-79	3,492	784,286	129	25,359	136.90	30,617	94	83
	80-89	837	206,232	99	24,623	63.80	15,808	155	156
	90 and over	29	8,682	8	1,185	3.90	1,159	*	*
	All ages	11,260	\$ 2,579,311	325	\$ 81,417	312.69	\$ 71,754	104%	113%
5	Up to 39	227	\$ 59,320	.....	.....	.40	\$ 110	.....	.....
	40-49	404	99,775	1	600	1.92	467	*	*
	50-59	1,690	366,571	3	971	16.68	3,602	*	*
	60-69	4,007	760,031	72	13,911	79.99	15,146	90%	92%
	70-79	3,499	748,538	120	26,450	137.43	29,557	87	89
	80-89	855	210,095	83	21,072	65.64	15,955	126	132
	90 and over	39	10,753	9	2,202	5.25	1,461	*	*
	All ages	10,721	\$ 2,255,083	288	\$ 65,206	307.31	\$ 66,298	94%	98%
6 and over	Up to 39	1,915	\$ 667,236	2	\$ 407	3.76	\$ 1,302	*	*
	40-49	4,125	1,389,927	22	7,969	18.98	6,316	116%	126%
	50-59	18,015	5,142,435	127	34,065	179.15	51,129	71	67
	60-69	49,836	12,732,557	872	198,634	1,016.41	258,236	86	77
	70-79	66,910	15,770,096	2,781	670,147	2,702.65	637,042	103	105
	80-89	24,604	6,702,045	2,417	687,722	1,897.89	524,164	127	131
	90 and over	1,846	459,686	384	102,498	266.47	66,229	144	155
	All ages	167,251	\$42,863,982	6,605	\$1,701,442	6,085.31	\$1,544,418	109%	110%
All	Up to 39	2,937	\$ 984,110	6	\$ 3,351	5.61	\$ 1,899	*	*
	40-49	6,417	2,080,965	33	10,292	29.69	9,507	111%	108%
	50-59	28,207	7,695,801	196	60,644	280.07	76,070	70	80
	60-69	71,938	17,807,252	1,190	288,963	1,452.07	358,495	82	81
	70-79	83,552	19,814,351	3,339	810,919	3,352.38	795,249	100	102
	80-89	28,215	7,670,997	2,767	798,533	2,168.37	596,980	128	134
	90 and over	1,963	489,271	418	109,043	282.43	70,324	148	155
	All ages	223,229	\$56,542,747	7,949	\$2,081,745	7,570.62	\$1,908,524	105%	109%

* Mortality ratios not shown where less than ten contracts terminated by death.

able significance in the light of the volume of data, a general downward tendency is to be noted. The mortality in the sixth and later contract years appears to be lower, the ratios by amounts of annual income having declined in all four categories and by number of policies in three out of four categories. In the third to fifth contract years, there has been a reduction in the mortality ratios by number of contracts in all four categories and by amounts of income in two of the categories. The first two contract years are more mixed as to the results. A noteworthy reduction in the mortality of male annuitants in these contract years seems to have taken place for nonrefund annuities, suggesting the possibility of a greater degree of self-selection on the part of male purchasers of such annuities in the last few years. On the other hand, female annuitants experienced a higher mortality in the first and second contract years. This may mean a lessened degree of anti-selection, or it may merely represent some correction of the very marked reductions in the mortality ratios in 1941-1946 as compared with the experience to 1941 anniversaries. The latter comparison will be found in *TASA XLIX*, 121.